PATENT ABSTRACTS OF JAPAN

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(21)Application number : 04-201259
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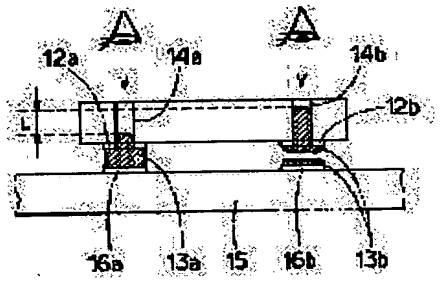
(71)Applicant : ROHM CO LTD
(72)Inventor : TAMAKI ZENICHI

(54) ELECTRONIC ELEMENT

(57)Abstract:
PURPOSE: To directly recognize whether mounting is normal by forming through holes from electrode terminals to the opposite surface side, in the electrode terminals and a main body.
CONSTITUTION: In a main body 11 and electrode terminals 12a, 12b, through holes 14 are formed from the electrode terminals 12a, 12b to the opposite surface of the main body 11. When a chip element is mounted on a circuit board 15, the electrode terminals 12a, 12b of the chip element are made to correspond with land electrodes 16a, 16b of the circuit board 15 by face down, the chip element is mounted on a circuit board 15, and soldering process is performed. Next the soldering state is visually observed from above. When the connection is perfect like the soldering part 13a between the electrode terminal 12a and the land electrode 16a, solder does not creep up in the through hole 14a. On the contrary, when the connection is imperfect like the soldering part 13b between the electrode terminal 12b and the land electrode 16b, the soldering part 13b creeps up as far as the upper part of the through hole 14b. Thereby whether mounting is normal can be discrimated and confirmed.



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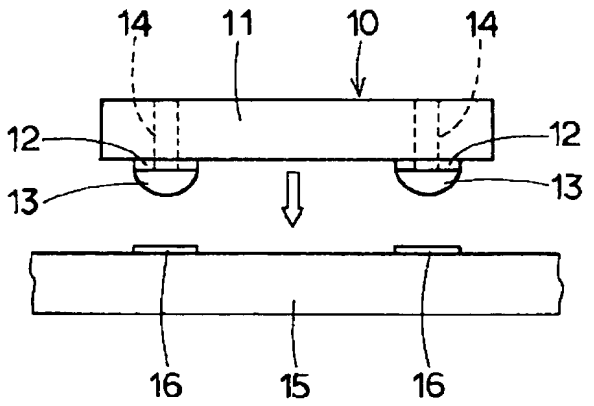
(54) 【発明の名称】電子素子

(57) 【要約】
【目的】　回路基板等に実装した場合に、実装の正常／不良の別を直接確認し得る電子素子を提供する。
【構成】　電極端子１２及びチップ素子本体１１に、電極端子１２からチップ素子本体１１の上面側に、スルーホール１４を設けた。



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【特許請求の範囲】

【請求項１】板状の本体の一面に、半田バンプを形成した電極端子を設けた電子素子において、

前記電極端子及び本体に、電極端子から本体の他面側にスルーホールを設けたことを特徴とする電子素子。

【請求項２】板状の本体の一面に、電極端子を設けた電子素子において、

前記電極端子及び本体に、電極端子から本体の他面側にスルーホールを設けたことを特徴とする電子素子。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】この発明は、チップ抵抗、チップコンデンサ、半導体素子等の本体が板状をした電子素子に関する。

【０００２】

【従来の技術】フェースダウン方式で回路基板等に実装するチップ素子（電子素子）は、従来、図５に示すように、板状の素子本体５１の下面に設けた電極端子５２に、さらに半田バンプ５３を形成し、この半田バンプ５３部分を、フェースダウンにより、回路基板５４上のランド電極５５に載置し、半田処理して、回路基板５４に実装している。

【０００３】

【発明が解決しようとする課題】上記した従来のチップ素子では、回路基板に実装した後の半田付け状態で、図６に示すチップ素子５１ａのように、電極端子５２がランド電極５４に半田５３で確実に接続された場合と、チップ素子５１ｂのように、電極端子５２がランド電極５４に接続されない場合が生じる。チップ素子５１ａは正しく実装され、チップ素子５１ｂは実装不良であり、実装後、これが確実に視認識別できることが好ましいが、従来のチップ素子は、本体で半田付け部が覆われてしまうので、正常実装と不良実装を直接、確認することができないという問題があった。

【０００４】この発明は、上記問題点に着目してなされたものであって、回路基板等に実装した場合に、実装の正常／不良の別を直接確認し得る電子素子を提供することを目的としている。

【０００５】

【課題を解決するための手段及び作用】上記課題を解決するために、請求項１記載の電子素子は、板状の本体の一面に、半田バンプを形成した電極端子を設けたものにおいて、前記電極端子及び本体に、電極端子から本体の他面側にスルーホールを設けている。この電子素子では、回路基板に実装され、電極端子と回路基板のランド電極が半田で正常に接続されると、半田が本体にスルーホールにほとんど入らない。これに対し、半田接続が不良な状態では、半田がスルーホール内に入り、本体上面付近に至る。本体上面より、スルーホールを目視することにより、スルーホール内の半田の上がり具合で、実装の正常／不良を確認できる。

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【０００６】請求項２記載の電子素子は、板状の本体の一面に、電極端子を設けたものにおいて、前記電極端子及び本体に、電極端子から本体の他面側にスルーホールを設けている。この電子素子では、回路基板のランド電極側に半田バンプが形成されるものであり、実装された後は、請求項１記載の電子素子と全く同様の理由で、素子本体上面より、直接、実装の正常／異常を確認することができる。

【０００７】

【実施例】以下、実施例により、この発明をさらに詳細に説明する。図１は、この発明の一実施例を示す側面図である。図１において、チップ素子１０は、板状の本体１１の一面（下面）に電極端子１２が設けられており、この電極端子１２の表面には、さらに半田バンプ１３が形成されている。以上の構成は図５に示したチップ素子と特に変わるところはない。

【０００８】この実施例チップ素子１０の特徴は、本体１１、及び電極端子１２に、電極端子１２からチップ素子本体１１の他面（上面）にかけてスルーホール１４を設けたことである。このようなチップ素子１０を、回路基板に実装するには、フェースダウンにより、チップ素子１０の電極端子１２部分を、回路基板１５のランド電極１６に対応させて、回路基板１５上に載置し、半田付け処理を行う。

【０００９】半田付け処理を行った後、チップ素子１０を、図２に示すように、上方から目視すると、図２の左側の電極端子１２ａとランド電極１６ａの半田部１３ａのように、完全な接続がなされていると、半田はスルーホール１４ａを上昇しない。したがって、上方から目視すると、半田部１３ａは、スルーホール１４ａの深部に見える。これに対し、図２の右側の電極端子１２ｂとランド電極１６ｂの半田部１３ｂのように、完全な接続がなされていず、半田部１３ｂが上下に離隔していると、この場合は、半田部１３ｂがスルーホール１４ｂの上部まで上昇している。したがって、上方から目視すると半田部１３ｂが、スルーホール１４ｂの上開口から近い浅部に見える。これら両者を比較すると、半田部１３ａと１３ｂの見える深さにＬの差があり、目視により、そのいずれであるかを確認することにより、つまり半田部１３がスルーホール１４の深部にある場合には、正常実装、浅部にあれば、不良実装であることを確認することができる。

【００１０】図３は、この発明の他の実施例を示す断面図である。図３において、チップ素子２０は、板状の本体２１の一面（下面）に電極端子２２が設けられており、またチップ素子本体２１及び電極端子２２に、電極端子２２からチップ素子本体２１の他面（上面）にかけてスルーホール２４を設けている。以上の構成は、図１に示したチップ素子と同様である。しかしながら、この

実施例のチップ素子は、図１に示すものと相違して、電極端子２２には、半田バンプを形成していない。

【００１１】このチップ素子２０は、自身に半田バンプを備えていない代わりに、回路基板２５に実装する場合に、回路基板２５のランド電極２６上面に、半田バンプ２７を形成しておき、チップ素子２０の電極端子２２を、回路基板２５の半田バンプ２７に対応させて、回路基板２５上にフェースダウンにより載置し、半田付け処理を行う。

【００１２】半田付け処理を行った後、チップ素子２０を図４に示すように、上方から目視すると、図４の左側の電極端子２２ａとランド電極２６ａの半田部２７ａのように、完全な接続がなされていると、半田はスルーホール２４ａを上昇しない。したがって、上方から目視すると、半田部２７ａはスルーホール２４ａの深部に見える。これに対し、図４の右側の電極端子２２ｂとランド電極２６ｂの半田部２７ｂのように、完全な接続がなされていず半田部２７ｂが上下に離隔していると、この場合は、やはり半田部２７ｂがスルーホール２４ｂの上部まで上昇している。そのため、上方から目視すると半田部２７ｂがスルーホール１４ｂの上開口付近に見える。したがって、図１の実施例の場合と同様に、半田付け処理後にチップ素子の上方からスルーホールを目視し、スルーホールに、半田部がどの程度しているかにより、正常実装／不良実装の別を確認することができる。

【００１３】

【発明の効果】この発明によれば、電極端子及び本体に、電極端子から本体の他面側にスルーホールを設けているので、半田付け処理後に、チップ素子の上方から、スルーホールを目視し、スルーホールに、半田がつまっているか否かを確認することにより、実装後、直ちに、実装の正常／異常を識別確認することができる。

【図面の簡単な説明】

【図１】この発明の一実施例を示す側面図である。

【図２】同実施例の実装状態の正常／異常の識別確認を説明するための断面図である。

【図３】この発明の他の実施例を示す断面図である。

【図４】同実施例の実装状態の正常／異常の識別確認を説明するための断面図である。

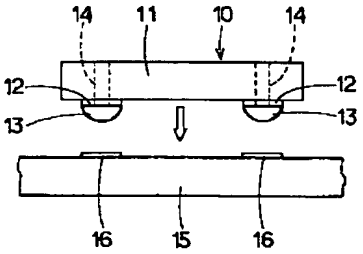
【図５】従来のチップ素子の実装を説明するための側面図である。

【図６】同従来のチップ素子の実装状態の問題点を説明するための側面図である。

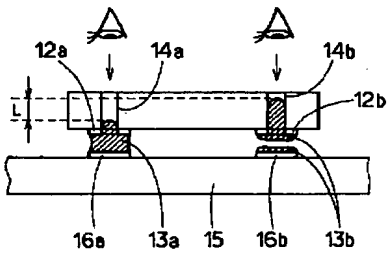
【符号の説明】

１０　チップ素子
１１　チップ素子本体
１２　電極端子
１４　スルーホール

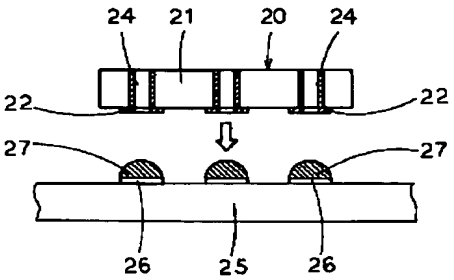
【図１】



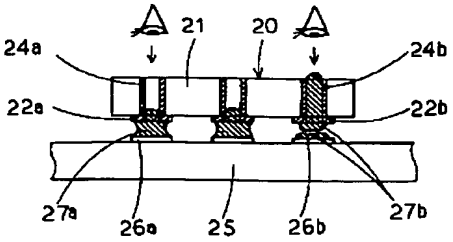
【図２】



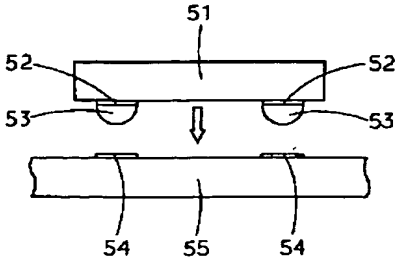
【図３】



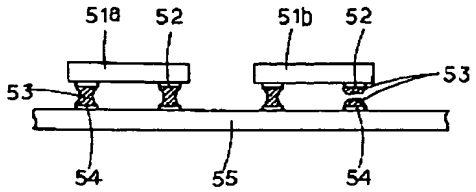
【図４】



【図５】



【図６】



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PURPOSE: To directly recognize whether mounting is normal by forming through holes from electrode terminals to the opposite surface side, in the electrode terminals and a main body.

CONSTITUTION: In a main body 11 and electrode terminals 12a, 12b, through holes 14 are formed from the electrode terminals 12a, 12b to the opposite surface of the main body 11. When a chip element is mounted on a circuit board 15, the electrode terminals 12a, 12b of the chip element are made to correspond with land electrodes 16a, 16b of the circuit board 15 by face down, the chip element is mounted on a circuit board 15, and soldering process is performed. Next the soldering state is visually observed from above. When the connection is perfect like the soldering part 13a between the electrode terminal 12a and the land electrode 16a, solder does not creep up in the through hole 14a. On the

contrary, when the connection is imperfect like the soldering part 13b between the electrode terminal 12b and the land electrode 16b, the soldering part 13b creeps up as far as the upper part of the through hole 14b. Thereby whether mounting is normal can be discrimated and confirmed.

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CLAIMS

[Claim(s)]

[Claim 1] The electronic device characterized by the thing of a body for which the through hole was established in the side on the other hand from an electrode terminal at said electrode terminal and body in the electronic device which prepared the electrode terminal which formed the solder bump in the whole surface of a tabular body.

[Claim 2] The electronic device characterized by the thing of a body for which the through hole was established in the side on the other hand from an electrode terminal at said electrode terminal and body in the electronic device which prepared the electrode terminal in the whole surface of a tabular body.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the electronic device to which bodies, such as a chip resistor, a chip capacitor, and a semiconductor device, carried out tabular.

[0002]

[Description of the Prior Art] As conventionally shown in drawing 5 , the chip type element (electronic device) mounted in the circuit board etc. by the face down method forms the solder bump 53 further, this solder bump 53 part is laid in the land electrode 55 on the circuit board 54 by face down, and carries out solder processing, and mounts it in the electrode terminal 52 prepared in the inferior surface of tongue of the tabular component body 51 at the circuit board 54.

[0003]

[Problem(s) to be Solved by the Invention] In the above-mentioned conventional chip type element, the case where an electrode terminal 52 is certainly connected to the land electrode 54 with solder 53, and the case where an electrode terminal 52 is not connected to the land electrode 54 like chip type element 51b arise in the state of soldering after mounting in the circuit board like chip type element 51a shown in drawing 6 R> 6. Chip type element 51a was mounted surely, mounting of chip type element 51b was poor, and after mounting, although it was desirable that this was made a visual recognition exception certainly, since the soldering section will be covered by the body, the conventional chip type element had the problem that normal mounting and defect mounting could not be checked directly.

[0004] This invention aims at offering the electronic device which can check the exception of normal/defect of mounting directly, when it is made paying attention to the above-mentioned trouble and mounted in the circuit board etc.

[0005]

[Means for Solving the Problem and its Function] what prepared the electrode terminal with which the electronic device according to claim 1 formed the solder

bump in the whole surface of a tabular body in order to solve the above-mentioned technical problem -- setting -- said electrode terminal and body -- an electrode terminal to a body -- on the other hand, the through hole is established in the side. In this electronic device, if it is mounted in the circuit board and the land electrode of the circuit board is normally connected with an electrode terminal with solder, solder will hardly go into a body in a through hole. On the other hand, in the condition with poor solder connection, solder enters in a through hole and results near the top face of a body. From the top face of a body, the normal/defect of mounting can be checked in the riser condition of the solder in a through hole by viewing a through hole.

[0006] that by which the electronic device according to claim 2 prepared the electrode terminal in the whole surface of a tabular body -- setting -- said electrode terminal and body -- an electrode terminal to a body -- on the other hand, the through hole is established in the side. At this electronic device, after being mounted by forming a solder bump in the land electrode side of the circuit board, normal/abnormalities of mounting can be directly checked from the top face of a component body by the completely same reason as an electronic device according to claim 1.

[0007]

[Example] Hereafter, an example explains this invention to a detail further. Drawing 1 is the side elevation showing one example of this invention. In drawing 1 , the electrode terminal 12 is formed in the whole surface (inferior surface of tongue) of the tabular body 11, and, as for the chip type element 10, the solder bump 13 is further formed in the front face of this electrode terminal 12. There are not a chip type element which showed the above configuration to drawing 5 , and especially a changing place.

[0008] The description of this example chip type element 10 is the chip type element body's 11 having been missing from the body 11 and the electrode terminal 12 on the other hand (top face) from the electrode terminal 12, and having formed the through hole 14. In order to mount such a chip type element

10 in the circuit board, by face down, the land electrode 16 of the circuit board 15 is made to correspond, electrode terminal 12 part of a chip type element 10 is laid on the circuit board 15, and soldering processing is performed.

[0009] If a chip type element 10 is viewed from the upper part as shown in drawing 2 after performing soldering processing, if perfect connection is made, solder will not go up through hole 14a like solder section 13of electrode terminal 12a [on the left-hand side of drawing 2], and land electrode 16a a. Therefore, when it views from the upper part, solder section 13a is visible to the deep part of through hole 14a. On the other hand, if perfect connection is not made and solder section 13b is being isolated up and down like solder section 13of electrode terminal 12b [on the right-hand side of drawing 2], and land electrode 16b b, solder section 13b will go up to the upper part of through hole 14b in this case. Therefore, when it views from the upper part, solder section 13b is visible to a near superficial part from upper opening of through hole 14b. If these both are compared, the difference of L is in the depth whose solder sections 13a and 13b are visible, and if it is in normal mounting and a superficial part when it is in the deep part of a through hole 14 to check [13] the any they are, i.e., the solder section, it can check that it is defect mounting by viewing.

[0010] Drawing 3 is the sectional view showing other examples of this invention. In drawing 3 , the electrode terminal 22 is formed in the whole surface (inferior surface of tongue) of the tabular body 21, and on the other hand (top face), the chip type element body 21 applied the chip type element 20 to the chip type element body 21 and the electrode terminal 22 from the electrode terminal 22, and it has formed the through hole 24. The above configuration is the same as that of the chip type element shown in drawing 1 . However, the chip type element of this example is different from what is shown in drawing 1 , and does not form the solder bump in an electrode terminal 22.

[0011] When it mounts in the circuit board 25 instead of not equipping self with the solder bump, it forms the solder bump 27 in land electrode 26 top face of the circuit board 25, this chip type element 20 makes the solder bump 27 of the

circuit board 25 correspond, lays the electrode terminal 22 of a chip type element 20 by face down on the circuit board 25, and performs soldering processing.

[0012] If a chip type element 20 is viewed from the upper part as shown in drawing 4 after performing soldering processing, if perfect connection is made, solder will not go up through hole 24a like solder section 27of electrode terminal 22a [on the left-hand side of drawing 4], and land electrode 26a a. Therefore, when it views from the upper part, solder section 27a is visible to the deep part of through hole 24a. On the other hand, if perfect connection is not made and solder section 27b is being isolated up and down like solder section 27of electrode terminal 22b [on the right-hand side of drawing 4], and land electrode 26b b, solder section 27b will go up to the upper part of through hole 24b too in this case. Therefore, when it views from the upper part, solder section 27b can be seen near through hole 14b top opening. Therefore, like the case of the example of drawing 1 , a through hole can be viewed from the upper part of a chip type element after soldering processing, and the exception of normal mounting / defect mounting can be checked by how many the solder sections are making it the through hole.

[0013]

[Effect of the Invention] According to this invention, the discernment check of the normal/the abnormalities of mounting can be immediately carried out after mounting by viewing a through hole from the upper part of a chip type element after soldering processing, and checking [of an electrode terminal to a body] whether solder is got blocked in the through hole on an electrode terminal and a body, since the through hole is established in the side on the other hand.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the side elevation showing one example of this invention.

[Drawing 2] It is a sectional view for explaining the discernment check of normal/abnormalities of the mounting condition of this example.

[Drawing 3] It is the sectional view showing other examples of this invention.

[Drawing 4] It is a sectional view for explaining the discernment check of normal/abnormalities of the mounting condition of this example.

[Drawing 5] It is a side elevation for explaining mounting of the conventional chip type element.

[Drawing 6] It is a side elevation for explaining the trouble of the mounting condition of the chip type element of ******.

[Description of Notations]

10 Chip Type Element

11 Chip Type Element Body

12 Electrode Terminal

14 Through Hole

[Translation done.]

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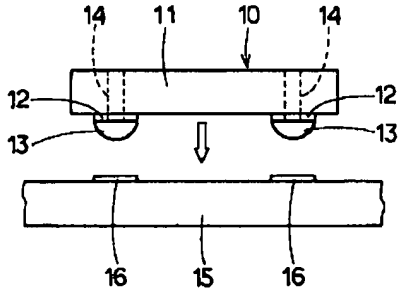
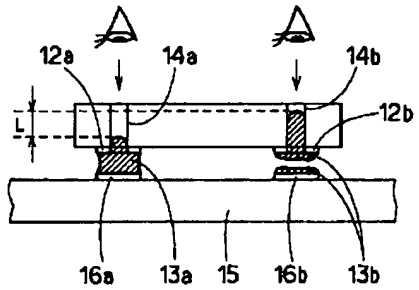
DRAWINGS

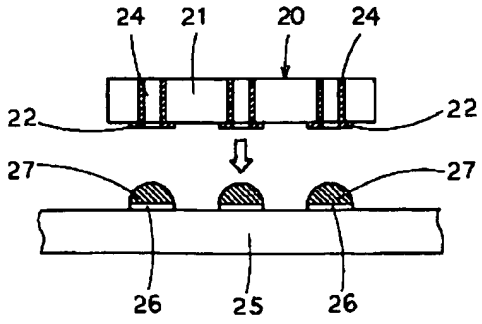
[Drawing 1]



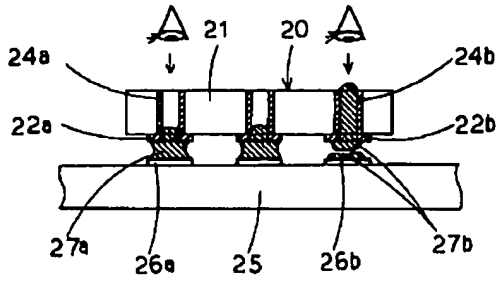
[Drawing 2]



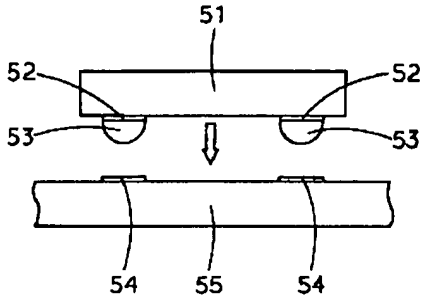
[Drawing 3]



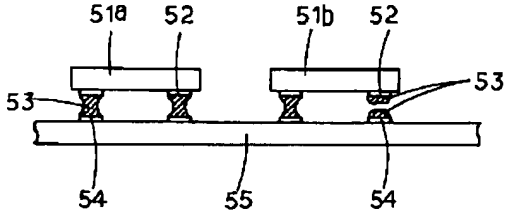
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Translation done.]